

Amendments to the Claims

1. (canceled)

2. (currently amended): Apparatus for fiber length measurements from a tapered beard attached to a fiber sampler, comprising:

a rectangular channel into which a tapered beard is drawn by a gas flow through said channel, said channel having two opposed major sides corresponding to channel width and length, and two opposed minor sides corresponding to channel height and length;

one of said major sides comprising a transparent window;

an optical imaging device viewing the tapered beard through said transparent window for acquiring a two-dimensional image of the tapered beard; and

The apparatus of claim 1, which further comprises a digital computer connected to an output of said optical imaging device for storing two-dimensional image data and determining fiber amount as a function of one-dimensional distance x from the fiber sampler by averaging across the width of the tapered beard as imaged.

3. (currently amended): The apparatus of claim 2 [[1]], wherein said optical imaging device comprises a scanner intended for scanning documents.

4. (original): The apparatus of claim 3, wherein said scanner is a color scanner.

5. (original): The apparatus of claim 3, wherein said scanner includes an illumination source.

6. (currently amended): The apparatus of claim 2 ~~[[1]]~~, wherein said optical imaging device comprises a digital camera.

7. (currently amended): The apparatus of claim 2 ~~Claim 1~~ wherein said rectangular channel has a height of approximately 2 mm, a width of approximately 100 mm, and a length of approximately 50 mm.

8. (original): The apparatus of claim 7, wherein gas flows through said channel at a rate of approximately 0.25 m³/sec.

9. (original): Apparatus for fiber length measurements from a tapered beard attached to a fiber sampler, comprising a scanner intended for scanning documents positioned with reference to the tapered beard for acquiring a two-dimensional image of the tapered beard.

10. (currently amended): The apparatus of claim 9, which further comprises a digital computer connected to an output of said scanner ~~optical imaging device~~ for storing two-dimensional image data and determining fiber amount as a function of one-dimensional distance x from the fiber sampler by averaging across the width of the tapered beard as imaged.

11. (currently amended): A method for image-based length measurement comprising:

acquiring a two-dimensional digital image of a tapered beard of fibers, the beard having a length;

employing a computer to analyze the digital image to determine fiber amount as a function of one-dimensional distance along the length of the tapered beard by averaging across the width of the tapered beard as imaged; and

analyzing the determined fiber amount as a function of distance to produce a fiber length distribution.

12. (original): A method for calibration of length measurement systems providing probability density functions (PDFs) for tapered beards, comprising:

forming a tapered beard subsample from a bulk sample of at least one sample of known, monolength staple fibers, the fibers of the bulk sample having diameter and surface properties similar to those of a subsequent sample under test having unknown length distributions;

measuring the uncalibrated amount versus distance response for each such monolength group;

developing correction functions from each such monolength sample to provide calibrated amount versus distance for said monolength fibers;

storing said calibration functions and interpolations thereof in a computer memory;

forming a tapered beard subsample of unknown length fibers and measuring the uncalibrated amount versus distance response;

correcting the uncalibrated amount versus distance response for said unknown tapered beard to produce a calibrated amount versus distance response;

determining the second derivative of said calibrated amount versus distance response for said unknown tapered beards;

normalizing and filtering the second derivative to produce a calibrated PDF for the unknown subsample; and

calculating from said calibrated PDF any length data products desired.

13. (original): The method of claim 12, wherein the desired statistics are UHM, ML, LUI, 2.5% span, or SFC.

14. (original): The method of claim 12 wherein the amount versus length response is from an image-based system.

15. (original): The method of claim 12 wherein the amount versus length response is from an air flow based system.

16. (currently amended): The method of claim 12 wherein the amount versus length response is from an optical extinction based ~~system~~ system.

17. (new): The apparatus of claim 2, wherein said optical imaging device provides spectrally-resolved data, and fiber amount as a function of one-dimensional distance x is determined based on data for a particular color.

18. (new): The apparatus of claim 10, wherein said scanner provides spectrally-resolved data, and fiber amount as a function of one-dimensional distance x is determined based on data for a particular color.

19. (new): The method of claim 11, which comprises acquiring spectrally-resolved image data, and employing the computer to determine fiber amount as a function of one-dimensional distance based on data for a particular color.